

Claims

What is claimed is:

- 1 1. A brazing strip or foil comprising:
2 a first metallic layer;
3 a second metallic layer; and
4 a core including one or both of titanium and zirconium sandwiched
5 between said first and said second metallic layers, wherein said
6 core has a metallic bond with said first and said second metallic
7 layers formed by roll bonding said core with said layers without
8 any intermediate heat treating.

- 1 2. The brazing strip or foil of claim 1, wherein said first metallic
2 layer is one of commercially pure copper and a copper alloy.

- 1 3. The brazing strip or foil of claim 2, wherein said second metallic
2 layer is one of commercially pure copper and a copper alloy.

- 1 4. The brazing strip or foil of claim 1, wherein said first metallic
2 layer is one of commercially pure nickel and a nickel alloy.

- 1 5. The brazing strip or foil of claim 4, wherein said second metallic
2 layer is one of commercially pure nickel and a nickel alloy.

- 1 6. The brazing strip or foil of claim 1, wherein said first metallic
2 layer is one of commercially pure copper and a copper alloy, and further
3 wherein said second metallic layer is one of commercially pure nickel and a
4 nickel alloy.

- 1 7. The brazing strip or foil of claim 1, wherein one of said first and
2 said second metallic layers is commercially pure copper.

1 8. The brazing strip or foil of claim 7, wherein the other of said first
2 and said second metallic layers is of commercially pure copper.

1 9. The brazing strip or foil of claim 7, wherein the other of said first
2 and said second metallic layers is one of nickel and a nickel alloy.

1 10. A self-brazing composite comprising the brazing strip or foil of
2 claim 1, which is metallurgically bonded to an additional alloy strip to form a
3 self-brazing material.

1 11. A brazing strip or foil comprising:
2 a first layer including one of commercially pure copper, a copper alloy,
3 commercially pure nickel, and a nickel alloy;
4 a second layer including one of commercially pure copper, a copper
5 alloy, commercially pure nickel, and a nickel alloy; and
6 a core including one or both of titanium and zirconium sandwiched
7 between said first and said second layers, wherein said core has
8 a metallic bond with said first and said second layers formed by
9 roll bonding said core with said layers without any intermediate
10 heat treating.

1 12. A self-brazing composite comprising the brazing strip or foil of
2 claim 15, further comprising an additional alloy strip roll bonded to one of said
3 layers to form a self-brazing material.

1 13. The brazing strip or foil of claim 11 wherein a thickness of said
2 strip or foil is reduced by cold rolling without any intermediate heat treating.

1 14. A strip or foil comprising:
2 a first layer including one of commercially pure copper, a copper alloy,
3 commercially pure nickel, and a nickel alloy;

4 a second layer including one of commercially pure copper, a copper
5 alloy, commercially pure nickel, and a nickel alloy; and
6 a core including zirconium sandwiched between said first and said
7 second layers, wherein said core has a metallic bond with said
8 first and said second layers formed by roll bonding said core
9 with said layers without any intermediate heat treating.

1 15. A self-brazing composite comprising the strip or foil of claim 15,
2 further comprising an additional alloy strip roll bonded to one of said layers to
3 form a self-brazing material.

1 16. The brazing strip or foil of claim 11, wherein a thickness of said
2 strip or foil is reduced by said cold rolling without any intermediate heat
3 treating.

1 17. A seven layer brazing strip or foil comprising:
2 a core including one or both of titanium or zirconium sandwiched
3 between a pair of strips or foils each as defined in claim 14,
4 wherein said core has a metallic bond with one surface of each
5 of said pair of strips or foils.

1 18. The brazing strip or foil of claim 17, wherein said metallic bond
2 of said core is formed by roll bonding without any intermediate heat treating.

1 19. A brazing strip or foil comprising:
2 a first metallic layer;
3 a second metallic layer;
4 a third metallic layer;
5 a fourth metallic layer, and
6 a titanium layer including titanium, with said first and said second
7 layers layered on one side of said titanium layer, and said third

8 and said fourth layers layered on another side of said titanium
9 layer.

1 20. The brazing strip or foil of claim 19, wherein at least one of said
2 first, said second, said third, and said fourth metallic layers is of commercially
3 pure copper.

1 21. The brazing strip or foil of claim 19, wherein at least one of said
2 first, said second, said third, and said fourth metallic layers is of commercially
3 pure nickel.

1 22. The brazing strip or foil of claim 19, wherein one of said first
2 metallic layer and said second metallic layer includes one of copper, a copper
3 alloy, nickel, and a nickel alloy, and further wherein one of said third metallic
4 layer and said fourth metallic layer includes one of copper, a copper alloy,
5 nickel, and a nickel alloy.

1 23. The brazing strip or foil of claim 19, wherein said first metallic
2 layer includes one of copper, a copper alloy, nickel, and a nickel alloy, and
3 wherein said second metallic layer includes one of copper, a copper alloy,
4 nickel, and a nickel alloy, and further wherein said third metallic layer includes
5 one of copper, a copper alloy, nickel, and a nickel alloy, and still further
6 wherein said fourth metallic layer includes one of copper, a copper alloy,
7 nickel, and a nickel alloy.

1 24. The brazing strip or foil of claim 23, wherein at least one of said
2 metallic layers has a metallurgical bond with said titanium layer formed by roll
3 bonding without any intermediate heat treating.

1 25. The brazing strip or foil of claim 19, wherein at least one of said
2 metallic layers has a metallurgical bond with said titanium layer formed by roll
3 bonding without intermediate heat treating.

1 26. The brazing strip or foil of claim 19, wherein each of said
2 metallic layers has a metallurgical bond with any adjacent metallic layer, said
3 metallic bond being formed by roll bonding without intermediate heat treating.

1 27. The brazing strip or foil of claim 19, wherein one of said first and
2 said second metallic layers includes one of copper and a copper alloy, and
3 wherein the other of said first and said second metallic layers includes one of
4 nickel and a nickel alloy, and further wherein one of said third and said fourth
5 metallic layers includes one of copper and a copper alloy, and still further
6 wherein the other of said third and said fourth metallic layers includes one of
7 nickel and a nickel alloy.

1 28. The brazing strip or foil of claim 27, wherein at least one of said
2 metallic layers has a metallurgical bond with said titanium layer formed by roll
3 bonding without intermediate heat treating.

1 29. The brazing strip or foil of claim 19, wherein a thickness of said
2 strip or foil is reduced by cold rolling without intermediate heat treating.

1 30. A brazing strip or foil comprising:
2 a first layer including one of copper and a copper alloy;
3 a second layer including one of nickel and a nickel alloy;
4 a third layer including one of nickel and a nickel alloy;
5 a fourth layer including one of copper and a copper alloy; and
6 a titanium layer of one of commercially pure titanium and a titanium
7 alloy with said first and said second layers layered on one side
8 of said titanium layer, and said third and said fourth layers
9 layered on another side of said titanium layer, wherein said
10 titanium layer has a metallic bond with at least one of said first,
11 said second, said third, and said fourth layers, said metallic
12 bond formed by roll bonding without intermediate heat treating.

1 31. The brazing strip or foil of claim 30, wherein said first layer and
2 said fourth layer are comprised of about 0.030" thick CDA 102Cu before
3 rolling and further wherein said second layer and said third layer are
4 comprised of about 0.030" thick 201Ni strips before rolling.

1 32. The brazing strip or foil of claim 31, wherein said first layer is roll
2 bonded to said second layer and are cold rolled to about 0.012" thick.

1 33. The brazing strip or foil of claim 30, wherein the weight
2 percentage of the resulting brazing strip or foil results in about a 15Cu-15Ni-
3 70Ti alloy upon brazing.

1 34. A brazing strip or foil comprising:
2 a core including of one or both of titanium and zirconium; and
3 at least one covering layer of one of commercially pure copper, a
4 copper alloy, commercially pure nickel, and a nickel alloy, said
5 covering layer substantially covering said core, wherein said
6 covering layer has a metallic bond with said core formed by roll
7 bonding without heat treating.

1 35. The brazing strip or foil of claim 34 further comprising:
2 at least one additional covering layer of one of commercially pure
3 copper, a copper alloy; commercially pure nickel, and a nickel
4 alloy, wherein said at least one additional covering layer
5 substantially covers said at least one covering layer.

1 36. The brazing strip or foil of claim 35, wherein said covering layer
2 has a metallurgical bond with said additional covering layer formed by roll
3 bonding without any intermediate heat treating.

1 37. A brazing strip or foil comprising:
2 a first metallic layer;

3 a second metallic layer;
4 a third metallic layer;
5 a fourth metallic layer;
6 a fifth metallic layer;
7 a sixth metallic layer, and
8 a core including one or both of titanium and zirconium, said first,
9 second, and third layers layered on one side of said core, and
10 said fourth, fifth, and sixth layers layered on another side of said
11 core.

1 38. The brazing strip or foil of claim 37, wherein at least one of said
2 layers is of commercially pure copper.

1 39. The brazing strip or foil of claim 37, wherein one or more of said
2 first metallic layer, said second metallic layer, and said third metallic layer
3 includes one or more of zirconium, copper, and nickel, and further wherein
4 one or more of said fourth metallic layer, said fifth metallic layer, and said
5 sixth metallic layer includes one or more of zirconium, copper, and nickel.

1 40. The brazing strip or foil of claim 39, wherein said second
2 metallic layer includes zirconium and is sandwiched between said first metallic
3 layer and said third metallic layer.

1 41. The brazing strip or foil of claim 40, wherein said second metallic
2 layer has a metallic bond with both said first and said third metallic layers,
3 said metallic bond formed by roll bonding said first, second, and third layers
4 together without heat treating.

1 42. The brazing strip or foil of claim 37, wherein
2 said second and fifth metallic layers include zirconium, and wherein

3 said first metallic layer includes one of copper and nickel and said third
4 metallic layer includes the other of copper and nickel; and
5 further wherein
6 said fourth metallic layer includes one of copper and nickel and said
7 sixth metallic layer includes the other of copper and nickel.

1 43. The brazing strip or foil of claim 42, wherein said core has a
2 metallic bond with said third and said fourth metallic layers formed by roll
3 bonding without intermediate heat treating.

1 43. The brazing strip or foil of claim 43, wherein
2 said second metallic layer has a metallic bond with said first and third
3 metallic layers and wherein
4 said fifth metallic layer has a metallic bond with said fourth and sixth
5 metallic layers, and further wherein
6 said metallic bonds are formed by roll bonding without intermediate
7 heat treating.

1 44. A brazing strip or foil comprising:
2 a first layer including one or both of nickel and copper;
3 a second layer including one or both of titanium and zirconium;
4 a third layer including one or both of nickel and copper;
5 a fourth layer including one or both of nickel and copper;
6 a fifth layer including one or both of titanium and zirconium;
7 a sixth layer including one or both of nickel and copper, and
8 a core including one of titanium and zirconium, wherein said core is in
9 a middle of said layers.

1 45. The brazing strip or foil of claim 44, wherein each of said layers has
2 a metallic bond with any adjacent layer, said metallic bond formed by roll
3 bonding without intermediate heat treating.

1 46. The brazing strip or foil of claim 44, wherein the weight
2 percentage of the resulting brazing strip or foil results in about a 20Cu-20Ni-
3 20Zr-40Ti alloy upon brazing.

1 47. The brazing strip or foil of claim 44, wherein the weight
2 percentage of the resulting brazing strip or foil results in about a 15Cu-10Ni-
3 37Zr-38Ti alloy upon brazing.

1 48. A brazing strip or foil comprising:
2 a first layer including one or both of nickel and copper;
3 a second layer including zirconium;
4 a third layer including one or both of nickel and copper;
5 a fourth layer including one or both of nickel and copper;
6 a fifth layer including zirconium;
7 a sixth layer including one or both of nickel and copper, and
8 a core layer including titanium layered in the center of said strip or foil,
9 wherein
10 said second layer has a metallic bond with both said first and said third
11 layers, and wherein
12 said core layer has a metallic bond with both said third and said fourth
13 layers, and further wherein
14 said fifth layer has a metallic bond with both said fourth and said sixth
15 layers, and still further wherein
16 said metallic bonds are all formed by roll bonding without heat treating.

1 49. The brazing foil or strip of claim 48, wherein said first and sixth
2 layers are of commercially pure copper.

1 50. The brazing strip or foil of claim 48, wherein the weight
2 percentage of the resulting brazing strip or foil results in about a 20Cu-20Ni-
3 20Zr-40Ti alloy upon brazing.

1 51. The brazing strip or foil of claim 48, wherein the weight
2 percentage of the resulting brazing strip or foil results in about a 15Cu-10Ni-
3 37Zr-38Ti alloy upon brazing.

1 52. A method of making a seven layer composite strip comprising
2 the steps of:
3 providing a first strip including one or both of nickel and copper;
4 providing a second strip including one or both of zirconium and
5 titanium;
6 providing a third strip including one or both of nickel or copper;
7 first roll bonding said first strip, said second strip and said third strip
8 together to form a metallic bond between said first strip and said
9 second strip and to form a metallic bond between said second
10 strip and said third strip to form an outer composite strip;
11 providing a core including one or both of titanium and zirconium; and
12 second roll bonding said core with a layer of said outer composite strip
13 on each side of said core to form a metallic bond between said
14 core and each of said outer composite strips to thereby form a
15 seven layer composite strip.

1 53. The method of claim 52 wherein said first roll bonding step is
2 accomplished without any intermediate heat treating step.

3 54. The method of claim 53 wherein said second roll bonding step is
4 also accomplished without any intermediate heat treating step.

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